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ABSTRACT

A learning module on the applications of microcomputers in instruction, which was developed for preservice and inservice teacher education at Queen's University at Kingston, was implemented within an existing introductory educational media course. An instructional development model (Dick and Carey, 1978) was used to identify instructional goals; analyze learner characteristics and objectives; design parameters; and develop, implement, and evaluate the instructional materials. Designed for use by pairs of students in a 1-hour microcomputer laboratory setting, the resulting module required students to identify and describe the functions of each element in the Apple II Plus microcomputer system and to operate an Apple II using three prepared instructional programs: "Legends" (tutorial); "Lemonade" (simulation); and "Don't Fall" (drill). An optional component introduced BASIC programming and required students to program the computer to generate the square roots of all even integers from 10 to 50. Initial implementation results were positive, although some revisions were recommended. This report includes the three-section module, a six-item quiz, and a course evaluation form. Eight references are listed. (LMM)

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THE INTRODUCTION OF MICROCOMPUTERS INTO AN INTRODUCTORY EDUCATIONAL MEDIA COURSE IN PRE-SERVICE TEACHER EDUCATION: A CASE STUDY.

by

C. Fred Johnston

Faculty of Education

Queen's University at Kingston

Paper presented at the Annual convention of the Association for Media and Technology in Education in Canada, Winnipeg, Manitoba, June 9, 1982.

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Abstract

Given the demand for teachers who are knowledgeable of the applications of microcomputers to instruction, the Faculty of Education at Queen's University in Kingston was confronted with the problem of identifying ways and means of preparing pre-service teachers to use microcomputers in instructional settings. One of a number of solutions adopted involved the design of a Learning Module to be introduced into an introductory media course, Introduction to Educational Media. The author describes the instructional development process and the positive student response to the module. Recommendations are made for revisions to the module.

C.F.J.

There has been considerable concern expressed about the nature and magnitude of change microcomputers will bring to bear on society in general (Nelson, 1977) and on education in particular (Papert, 1980). In an uncommon display of concern the Ministry of Education in Ontario has identified specifications for the development of a made-in-Canada educational microcomputer (1981) and provided stimulation funds for the authoring of exemplary computer based learning materials (1982).

Those involved with pre-service and in-service teacher education are under pressure to develop programmes to prepare teachers for the wholesale use of microcomputers into the schools. Responding to a perceived need the Faculty of Education at Queen's University acquired five Apple II Plus microcomputers in the early summer of 1981 and began to explore the ways and means of incorporating them into the Bachelor of Education programme. It was decided among other things to provide student teachers with an initial exposure to microcomputers within an existing course, Introduction to Educational Media.

This paper describes the process and outcome of this instructional development project.

Procedures

An instructional development model (Dick and Carey, 1978) was adopted to guide instructors through the various stages from conceptualization to implementation and evaluation of the unit.

Identification of Instructional Goals

The unit of instruction had to serve several broad instructional intents:

- it must provide a non-threatening and enjoyable learning experience to enhance the perception of the computer as a "user-friendly" device;
- students must become aware of the significant role computers can perform in instructional settings.

Analysis of Learner Characteristics

The student population is apportioned to two major Bachelor of Education programmes, one Consecutive, the other Concurrent and one minor programme, Diploma in Technical Education. Table 1 indicates the distribution of student teachers within each programme and teaching division, Primary-Junior (P/J), Junior-Intermediate (J/I), and Inter-

mediate-Senior (I/S).

- -

(Table 1 about here)

- -

Sixty-nine percent of the student population is female. Of the total student population 78.7% is enrolled in the course, Introduction to Educational Media, one of several optional courses available to students within the Skills component of the B.Ed. programme. The large number of students who chose to enroll in this course is one measure of its popularity and perceived value.

When designing the microcomputer module for the course it was assumed that students had little or no prior experience learning with a microcomputer.

Identification of Objectives

The constraints to be identified made it difficult to develop a learning module that was competency based. (This initial exposure to microcomputers was premised on the assumption that additional interest courses would be available during the second term for those who wanted to pursue the medium in some depth.) Accordingly, two required objectives and one optional were adopted:

Required	1.	Students will be able to identify and describe the function of each element in the Apple II Plus microcomputer system (hardware).
	2.	Students will demonstrate the ability to operate the Apple II microcomputer using three prepared instructional programmes.
Optional	3.	Students will be introduced to computer software (Basic), and given explicit directions will programme the computer to perform a simple mathematic operation.

Design Parameters

There were a number of given conditions which influenced the design of the learning module.

1. Introduction to Educational Media has been a popular course with students, habitually

attracting between 75% and 85% of the total enrollment. As enrollment in the B.Ed. programme increased from 190 in 1968-69 to 697 in 1973-74 the mode of course delivery was altered to accommodate the increased numbers. Commencing with 1974-75 a large group/lab format was introduced. Large group sessions were used to demonstrate the effective use of the various media; open labs allowed students to develop knowledge and skills related to the operation of instruction and production machines and processes. The new learning module on microcomputers had to conform to the organizational structure presently used in the course.

2. Only four Apple II Plus microcomputer stations were available for the lab[1], and these had to be shared with other programme needs in the faculty. Time available for the lab exercise was restricted to a two-week block.

3. Not only was there a limit to the machine time, there was also a severe limit on the amount of technical assistance that could be made available to assist students during the lab exercise. The design of the learning module had to accommodate a large number of students (458) in a two-week block of time with a minimum of technical assistance.

Instructional Strategies and Materials

The instructor assisted by an instructional development specialist and a computer programmer prepared a learning module[2] which has the following components.

1. Statement of Purpose and Objectives. (As identified previously in this paper).

2. Time allowance. Students working in pairs had 60 minutes of machine time to complete the appropriate activity in the module.

3. Sequence of Activities. Students were directed to read over parts 1 to 5 before booking into the microcomputer lab.

4. Introduction to Computers. This section defined basic terminology relating to hardware, software and instructional strategies.

5. How to Ready the Apply II Microcomputer for Operation. Using task analysis, a carefully sequenced list of operations was identified. The sequence of operations combined with a number of whole-to-part line drawings enabled the student to complete the microcomputer exercises.

6. Exercise I: Utilizing the Apple II Microcomputer with Prepared Programs. Instructions and simplified drawings were used to direct students to interact with the microcomputer using three commercial programmes:

   - "Legends," a tutorial exercise from Apple Pilot, a demonstration diskette.
   - "Lemonade," a simulation exercise from a demonstration diskette, Elementary, My Dear Apple.
   - "Don't Fall," a drill exercise, also from the diskette, Elementary, My Dear Apple.

7. Exercise II: Programming the Apple II Computer. Explicit directions enabled the students to programme the microcomputer using Basic language to perform a simple mathematical operation, the generation of square roots of all even integers from 10 to 50.

8. Quiz. A six item multiple choice quiz was prepared, to be completed at the end of the lab exercise.

Evaluation

A Module Evaluation Instrument was prepared to obtain information and student opinions relating to the learning programme. Following guidelines recommended by Nathenson and Henderson (1980), student opinion relating to such matters as clarity of language, level of difficulty, learning time, and satisfaction was measured using an eleven item, five point Likert scale. Four items requested specific information and two opportunities were provided for written responses.

Testing the Prototype

The module was examined for face validity by two colleagues. On the invitation of the instructor, six students volunteered to test out the learning module, after which revisions were made.

Implementation

The instructional module was printed and circulated to all students in the course. They were requested to sign up in pairs for a one-hour slot over the course of a two-week block of time. Students were directed to read sections 1 to 5 before completing sections 6 and 7 which required computer interaction. A technical assistant was on hand to monitor the lab and assist students with problems encountered throughout.

Evaluation of the Learning Module

Student responses on the Module Evaluation Instrument were tallied and grouped into two tables. Table 2 records student opinions to each of the eleven items by frequencies and percentages along with the mean and standard deviation. Table 3 provides a simple numerical summary of responses to the four explicit questions.

Results

An examination of Table 2 reveals a very positive response to the process and outcome of the new module on microcomputers. Approximately 82% of the sample expressed the opinion that the new lab was a

- -

(Table 2 about here)

- -

valuable addition to the course. There were no serious concerns indicated about the clarity of objectives (item 1), terminology (item 2), operations in general (item 3), and Exercises I (item 4a) and II (item 6a)

in particular, although it should be noted that the lowest percentage response and the largest mean (1.61) was associated with the item dealing with clarity of the operations (item 3). "Don't Fall" was ranked highest in order of satisfaction followed by "Legends" and "Lemonade". The time allowed for Exercises I and II was adequate for all but a very small number of students.

- -

(Table 3 about here)

- -

Table 3 provides a numerical and percentage response to four specific questions. Only 46.4% of the students attempted the optional Exercise II; of those, 96.3% were successful in programming the computer. Eighty-six percent of the students managed to complete the lab with two or less requests for technical assistance and only 26.1% indicated that they used the full 60 minutes allowed for the lab.

Recommended Revisions

The student evaluation of the learning module has identified several ways in which it can be revised and improved before it is used again.

1. Clarity of operations.
   Students' responses to item 3 (Clarity of operations), item 4(f) (Number of requests for assistance), and written confirmation of problems by page and line clearly identify the location in the module where editorial changes are required. An examination of the script cited by students reveal two basic kinds of problems, a sequencing error and a lack of clarity between verbal descriptions of an operation and labelled diagrams.

2. Optional Programmes in Exercise I.
   One might conjecture that the increased variance in student responses to "Legends" and "Lemonade" originates with students in the Intermediate/Senior Division who found the programmes elementary. A number of written comments confirms this impression. There needs to be a number of optional programmes within Exercise II to accommodate student teachers from different divisions with different curricular interests.

3. Revision to Exercise II.
   Only 46.4% of the respondents chose to attempt Exercise II. There may have been two reasons for this small number; lack of time and lack of interest.

Some students indicated that the mathematical/ abstract nature of the exercise deterred them from attempting programming. It might prove more interesting and popular to have students programme the Turtle, using Logo, to perform some spatial maneuvres.

4. Increase in lab time.
Fifty-four percent of students required in excess of 50 minutes to complete the lab; written responses indicated that some students spent too much time on Exercise I and did not have sufficient time for the optional exercise. It would seem appropriate to increase the lab time by 15 minutes.

Conclusion

The case study described herein is a modest effort to prepare pre-service teachers to deal with the impact of microcomputers in instruction. Its primary goal is to promote a positive attitude, and a degree of user confidence, desirable prerequisites for a commitment to microcomputers in instruction.

Why teachers should be knowledgeable about microcomputers is a more profound question that needs to be addressed by in-service and pre-service teacher education programmes. It is to be hoped that the Faculty of Education at Queen's University will address this greater problem with dispatch and a measure of success.

Notes

[1]Each station had an Apple II Plus, 48K microcomputer with a 16K memory expansion board, disk drive, and a Panasonic video display monitor.

[2]See Appendix A for the Learning Module.

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TABLE 1

DISTRIBUTION OF STUDENTS BY PROGRAMME AND DIVISION

Programmes	DIVISIONS						Totals	
	P./J.		J./I.		I./S.			
	Number of Students	As a %	Number of Students	As a %	Number of Students	As a %	Number of Students	%
Concurrent	61	10.5	27	4.6	11	1.9	99	17.0
Consecutive	164	28.2	99	17.0	198	34.0	461	79.2
Dip. in Tech. Ed.	-	-	-	-	22	3.8	22	3.8
Total Enrollment	225	38.7	126	21.6	231	39.7	582	100%

TABLE 2

DISTRIBUTION OF RESPONSES WITH MEAN AND STANDARD DEVIATION

Item	Responses by intervals										N	$\bar{X}$	Sd
	1		2		3		4		5				
	f	%	f	%	f	%	f	%	f	%			
1. Clarity of objectives	246	67.8	92	25.3	19	5.2	5	1.4	1	.3	363	1.41	.680
2. Clarity of terminology	249	68.6	93	25.6	18	5.0	3	.8	0	.0	363	1.38	.620
3. Clarity of operations	220	60.6	86	23.7	40	11.0	14	3.9	3	.8	363	1.61	.889
4.(a) Exercise I - Clarity	260	71.6	79	21.8	19	5.2	3	.8	2	.6	363	1.37	.673
4.(b) Legends-Satisfaction	245	68.3	80	22.3	27	7.5	5	1.4	2	.6	359	1.44	.740
4.(c) Lemonade -Satisfaction	252	69.4	62	17.1	38	10.5	8	2.2	3	.8	363	1.48	.831
4.(d) Don't Fall-Satisfaction	256	72.7	74	21.0	16	4.6	3	.9	3	.9	352	1.36	.690
4.(e) Time	285	80.1	52	14.6	9	2.5	8	2.3	2	.6	356	1.29	.676
6.(a) Exercise II -Clarity	109	67.3	37	22.8	13	8.0	3	1.9	0	.0	162	1.44	.720
6.(b) Exercise II -Time	110	74.3	21	14.2	9	6.1	8	5.4	0	.0	148	1.43	.831
7. Module Satisfaction	209	81.6	36	14.1	10	3.9	1	.4	0	.0	256	1.23	.528

TABLE 3

DISTRIBUTION OF RESPONSES TO EXPLICIT QUESTIONS

Item	Requests for help												N
	0		1		2		3		4		5		
	f	%	f	%	f	%	f	%	f	%	f	%	
4. (f) Requests for assistance	106	30.6	119	34.3	75	21.6	35	10.1	10	2.9	2	.6	34

	YES		NO		N
	f	%	f	%	
5. Attempts at Exercise II	165	46.4	191	53.7	356

	YES		NO		N
	f	%	f	%	
6. (b) Exercise II Successful Completion	158	96.3	6	3.7	164

	20-29 min.		30-39 min.		40-49 min.		50-59 min.		50+ min.		N
	f	%	f	%	f	%	f	%	f	%	
8. Time to Completion	9	2.7	39	11.9	102	31.0	93	28.3	86	26.1	329

APPENDIX I

G. F. Johnston

FACULTY OF EDUCATION
Queen's University

UNIT 5: MICROCOMPUTERS

This is a new unit in the Educational Media Course. The instructors wish to thank Professors Dale Burnett and Don Campbell and Mr. Tom Boyle for their considerable help in developing this instructional module.

Fred Johnston
George Southall

PURPOSE

Through this unit you will be introduced to the small but relatively powerful microcomputer which is a common sight at the secondary school level and not uncommon at the elementary school. There is no intention that you will acquire any competence to use the computer to resolve problems, you will not become familiar with any of the software formats. This initial exposure is intended to acquaint students with a sample of the hardware - the APPLE II microcomputer, and samples of commercially-distributed courseware.

OBJECTIVES

1. Students will be able to identify and describe the function of each element in the APPLE II computer learning system. (Hardware)

2. Students will demonstrate the ability to operate the APPLE II microcumputer using three prepared instructional programmes. (Courseware)

OPTIONAL

3. Students will be introduced to Computer Software, and given explicit directions will programme the computer to perform a simple mathematical operation.

APPROXIMATE TIME: Students, in pairs, will be given minutes to complete the two exercises (no. 2 is optional.) NOTE: READINGS MUST BE COMPLETED BEFORE ATTEMPTING THE EXERCISE.

ACTIVITIES

1. Read: Introduction to Microcomputers pp 2 - 7.

2. Read: How to Ready the APPLE II Microcomputer for Operation, pp 8-11.

3. Read over Lab Exercise One: Utilizing the APPLE II Microcomputer with Prepared Programmes, pp 12-14.

4. Optional Exercise II: Programming the APPLE II Microcomputer, pp 15-18.

5. Sign up outside of the Instructional Computer Room (A313) for a time slot in which to complete the lab exercises. NOTE: the exercise will be done in pairs.

6. At the approximate time, go to Room A313 and complete the exercise. PLEASE ARRIVE AND LEAVE ON TIME.

7. Complete the Unit Quiz and score it in the Educational Media Lab.

8. Complete the New Unit Student Evaluation form, pp 19-20.

9. During normal lab hours, hand to the lab instructor in the Media Lab:
   - .the quiz results
   - .the Unit Evaluation results and the
   - .Lab 5 control card.

For the past three decades reference has been made to the impending computer revolution so far reaching as to affect directly the life of each and every person in an advanced technological society. To date the impact has been less than direct for many persons. With the introduction of the small personal computers or microcomputers, we find ourselves on the cutting edge of the long-awaited revolution.

As a prelude to the remarks which follow, you should be aware of three basic terms which collectively make up a fully integrated computer system, namely, the Hardware, Courseware and Software.

HARDWARE: this refers to the physical aspects of the system, the equipment and the material used with the equipment. For example, the computer machine plus the magnetic reel of tape or a magnetic disk combine to represent the hardware element of the computer.

COURSEWARE: this refers to the specific programme or a series of programmes contained on a magnetic tape or disk. Considerable courseware on a wide variety of topics is available for sale from commercial suppliers.

SOFTWARE: In order for someone to create a programme-courseware - that someone must be familiar with the language and thought process of a given computer system - the software of the computer system. Different computer systems have different languages, some of which are: COBOL, FORTRAN, LOGO, PASCAL etc. To be able to manufacture and distribute courseware, someone must master the software of the system to be able to write/create programmes to put on to magnetic disks and tapes to use in the computer.

COMPUTER HARDWARE:

Recall that in 1956 the world's most powerful computer occupied 1,000 cubic feet of space, a room ten by ten. By 1970 a computer with that same capacity could be housed in a box 10 cubic feet in size. To-day, it is more than likely a hefty size trunk. Over this period of time computers have been large and expensive and few could afford them except government and large corporations, and only then, when they were shared with remote users who paid a fee to acquire a remote terminal which would give them access to these expensive machines.

Thanks to the invention of miniaturized electronic circuitry, computers can be built small and powerful at such a price that one need no longer think in terms of having to share with someone

eise the services of a computer. These stand-alone microcomputers can now be purchased in storefront operations in most large cities. They usually contain

.the typewriter-like keyboard with the circuitry and
.a t.v. screen or a printer.

Common multi-purpose microcomputers for use in school, home and small business office are:

TRS 80, Models I & III (Radio Shack)
The PET (Commodore Business Machines)
The CHALLENGER (Ohio Scientific)
The APPLE, MODEL II (Apple Corp.)

Of course specialized computers such as word processors have been available for some time.

With the large number of small stand-alone computers on the market, the problem of selection grows more difficult daily. Computers vary most importantly in memory size or capacity and in peripheral equipment. Memory size is measured in "bytes". (One alpha/numeric character occupies one byte of memory) and in microcomputers the range varies from 4,000 to 64,000 bytes (4K to 64K).
Peripheral equipment would include:

. a storage device, the most common being disk drive or cassette recorder

. printer
. plotter
. graphic tablets
. card readers
. sound generation/playback machines etc.

Needless to say, the various components from each system can seldom be interchanged between systems. The equipment compatibility problem is ever present.

COMPUTER SOFTWARE:

A greater problem is posed by the different languages associated with a given hardware system. There are a multitude of languages available for both specific tasks and general data processing. Each language excels in some given task and falls short in others. Some of the more common languages are:

FORTRAN (science
COBOL (business)
PASCAL (computer science courses)
BASIC (personal computer market)

3) PASCAL

```
PROGRAM CAPITAL;

VAR
  ANSWER : STRING;

BEGIN

  WRITELN ('WHAT IS THE CAPITAL OF CANADA?');
  READLN (ANSWER);
  WHILE ANSWER <> 'OTTAWA' DO
    BEGIN
      WRITELN ('PLEASE TRY AGAIN.');
      WRITELN ('WHAT IS THE CAPITAL OF CANADA?');
      READLN (ANSWER)
    END;
  WRITELN ('VERY GOOD')

END.
```

4) LOGO

```
T O CAPITAL
  PRINT [WHAT IS THE CAPITAL OF CANADA?]
  MAKE "ANSWER REQUEST
  IF :ANSWER = [OTTAWA] THEN PRINT [VERY GOOD.] STOP
  CAPITAL
END
```

COMPUTER COURSEWARE:

Small stand-alone computers are now being placed in the majority of Ontario high schools and they are no longer uncommon at the elementary schools. The availability of such hardware has two main types of curriculum implications for schools. On the one hand the equipment suggests the need to develop courses that teach students about computers (e.g. computer science courses, word processing courses, business data processing courses, computer technology courses etc.). There is more utilization of computers in this context than in the second way, namely, to teach conventional subjects using the computer. This requires the availability of a wide range of subject courseware to fulfill a variety of instructional needs.

Learning using the computer, or C.A.I.(Computer Assisted Instruction) makes use of a variety of instructional strategies, which are:

1. drill and practice
2. tutorial
3. simulation/games
4. dialogue
5. problem solving
6. interesting environments.

Briefly these terms are used as follows:

1. Drill & Practice - a sequence of questions, which may or may not be graded by level of difficulty and in which the student receives a message indicating whether his response is correct or incorrect.
   Some examples could include: 10 problems in single-digit addition, capitals of the provinces, chamical valences and foreign language vocabulary. One of the exercises in this Lab will give a further hands-on demonstration of this approach.

2. Tutorial - a sequence of material, beginning with some information on a topic, followed by some questions. Student responses determine the next module of information which could be remediation, enrichment or the next unit. In contrast to drill & practice, there is a strong intent to "teach" with this strategy.

3. Simulation/Games - a problem-situation reflecting a physical or social phenomena where the student reaches certain decisions which then affect subsequent events in the simulation/game. Examples of simulations include: models of the spread of malaria, water pollution, historical battles, voting behaviors, chemistry experiments, operating a nuclear reactor. Examples of games include: chess, tic-tac-toe, space invaders and dungeons and dragons.

4. Dialogue - relatively free-form conversation, relatively rare at the present.

5. Problem-Solving - learning a specific programming language, (PASCAL, BASIC, APL, FORTRAN, COBOL....), in order to write your own programmes.

5. Interesting environments - a situation where the student is relatively free to explore various possibilities within a well-defined set of constraints. Examples include: LOGO-turtle geometry, APL-math lab, and ALF music systems. At a more specific level, an "interesting environment" could be established within the domain of quadratic functions. The student would merely specify values for the three coefficients in a quadratic expression and the computer would immediately display the appropriate curve.

A large amount of courseware is commercially available covering the range of the school system from primary school to college. Unfortunately, it is of uneven quality.

This unit of the Educational Media course is meant to introduce you to a sample of the hardware - APPLE II and several examples of commercially distributed courseware.

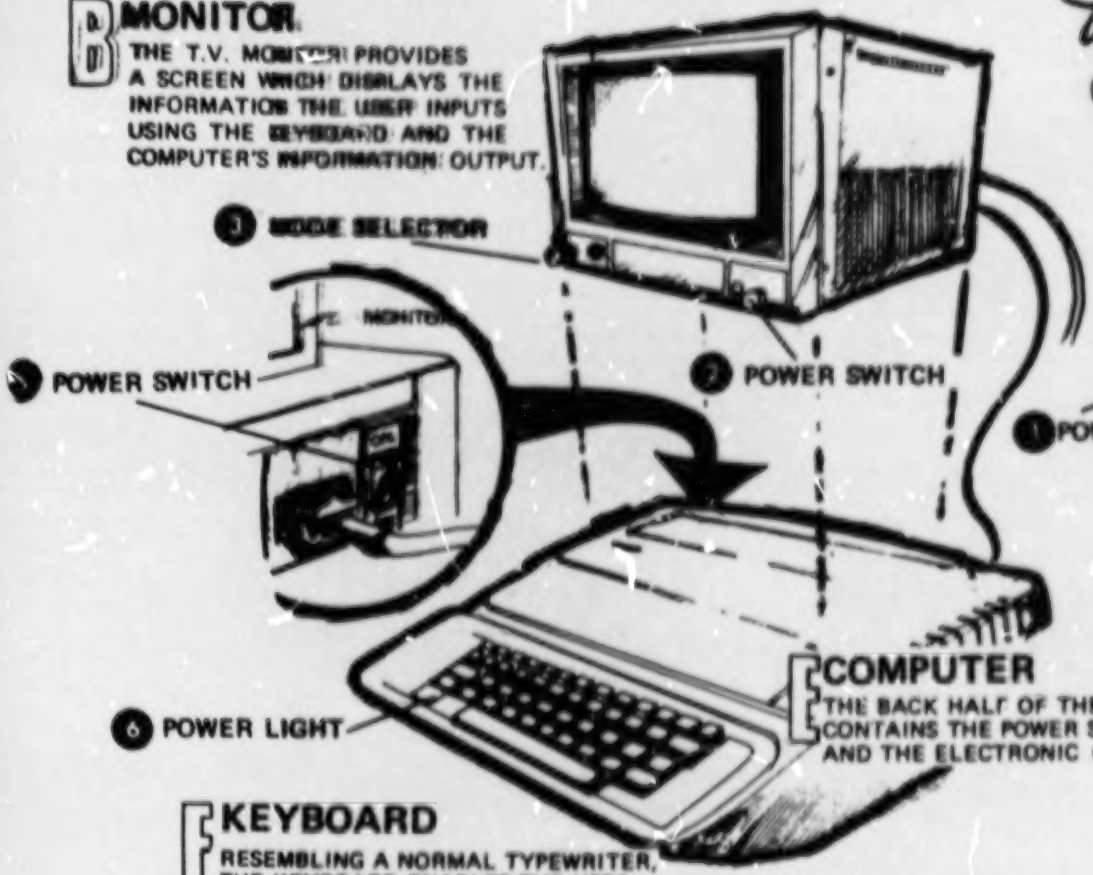
There is no serious effort to introduce you to any specific language so that you can write your own programme (software) although there is an optional exercise in which you do programme the computer to solve simple arithmetic problems.

the computer

COMPONENT PARTS OF THE APPLE II MICRO-

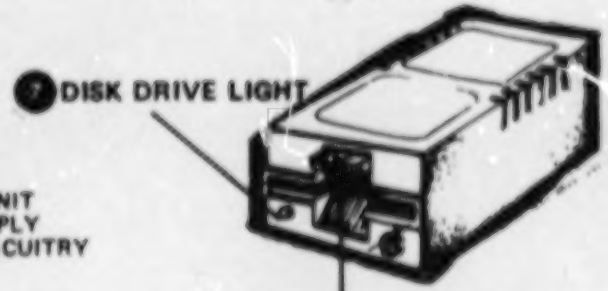
B MONITOR

THE T.V. MONITOR PROVIDES A SCREEN WHICH DISPLAYS THE INFORMATION THE USER INPUTS USING THE KEYBOARD AND THE COMPUTER'S INFORMATION OUTPUT.



A POWER BAR

THIS CONVENIENCE PROVIDES AN ACCESS TO MULTIPLE ELECTRICAL OUTLETS.



E COMPUTER

THE BACK HALF OF THE UNIT CONTAINS THE POWER SUPPLY AND THE ELECTRONIC CIRCUITRY

F KEYBOARD

RESEMBLING A NORMAL TYPEWRITER, THE KEYBOARD ENABLES THE USER TO "TALK" TO THE COMPUTER.

C DISK DRIVE

THE DISK DRIVE ACTS LIKE A TAPE RECORDER AND SERVES TWO IMPORTANT FUNCTIONS:

IT WILL PLAY-BACK PRE-RECORDED INFORMATION ON THE DISKETTE.

and

IT WILL RECORD INFORMATION ON COMMAND OF THE COMPUTER.

D FLOPPY DISKETTE

THE DISKETTE IS A MAGNETIC RECORDING MEDIUM MUCH LIKE AN AUDIO TAPE EXCEPT THAT IT IS IN DISC FORM. INFORMATION IS RECORDED ON THE SURFACE OF THE DISKETTE.

How to Ready the
APPLE II MICRO COMPUTER
for Operation

TO ACTIVATE THE COMPUTER

The following instructions will permit the user to make contact with the computer programme being used. At that point the programme will take over. Keep the Diagram of the Computer in front of you as you read over these instructions.

NOTE: FOLLOW THE DIRECTIONS. DO NOT APPLY FORCE TO ANY OF THE CONTROLS. IF IN DOUBT, REQUEST THE HELP OF THE LAB TECHNICIAN.

1. Check to see that the POWER SWITCH 1 on the POWER BAR A is "ON".

2. Turn the POWER SWITCH 2 on the MONITOR B to "ON".

3. Check the MODE SELECTOR 3 on the MONITOR B to see that it is in the "LINE" position. (Button should be out.)

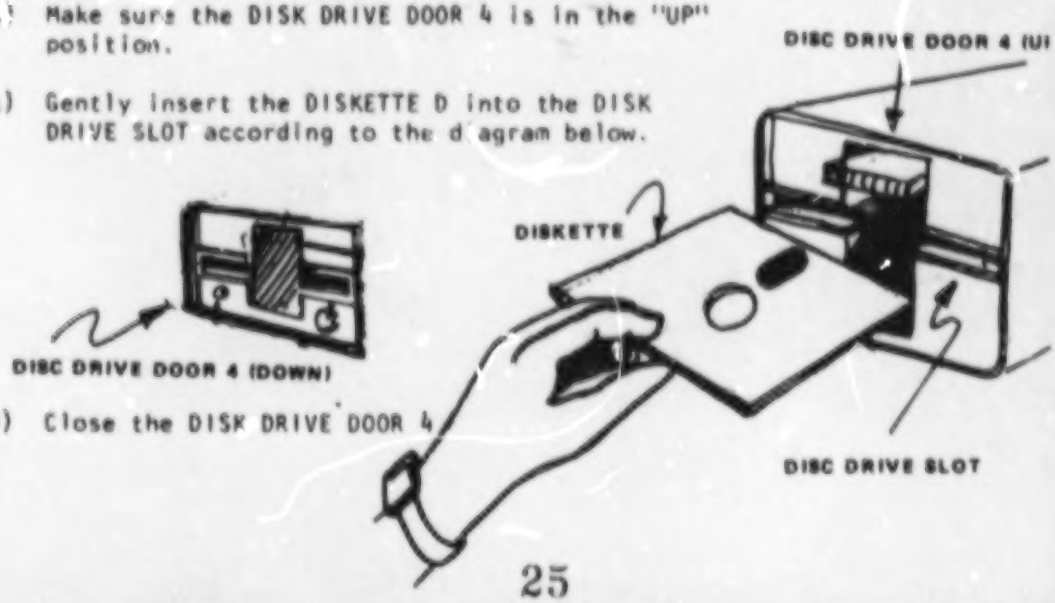
4. Insert a DISKETTE D into the DISK DRIVE C.
   PRECAUTION: *WHEN NOT IN THE DISK DRIVE, THE DISKETTE MUST BE IN ITS STORAGE ENVELOPE. NEVER LEAVE THE DISKETTE LYING DOWN WITHOUT IT BEING IN ITS EXTERNAL ENVELOPE.

   THE DISKETTE, EVEN WHEN IN THE DISK DRIVE, REMAINS IN A PAPER JACKET WITH ONLY TWO SMALL EXPOSED SURFACES. WHEN HANDLING THE DISKETTE, DO NOT TOUCH THE EXPOSED SURFACE WITH YOUR FINGERS.

   a) Remove the DISKETTE D from its external envelope.

   b) Make sure the DISK DRIVE DOOR 4 is in the "UP" position.

   c) Gently insert the DISKETTE D into the DISK DRIVE SLOT according to the diagram below.



   d) Close the DISK DRIVE DOOR 4

NOTE: General Care of the Diskette

Most of the problems a user might have with the APPLE system will involve the DISKETTE. These problems can be minimized if certain precautions are followed.

i) Keep the DISKETTE away from magnetic fields produced by transformers, motors or magnets. DO NOT PLACE A DISKETTE ON TOP OF THE DISK DRIVE OR ON TOP OF THE T.V. MONITOR.

ii) Keep the DISKETTE away from extreme temperatures - hot or cold. DO NOT PLACE A DISKETTE IN DIRECT SUNLIGHT.

iii) The DISKETTE should not be exposed to smoke, cigarette ashes or dust. BE CAREFUL OF CHALK DUST.

iv) Do not leave a DISKETTE in the DISK DRIVE for a prolonged period of time, overnight for example. The continued pressure from the DISK DOOR can wrinkle the DISKETTE.

REMOVE THE DISKETTE FROM THE DISK DRIVE AFTER USING, AND PLACE IT IN THE STORAGE ENVELOPE.

v) THE FOLLOWING POINTS ARE NOT RELEVANT TO THIS LAB EXERCISE BUT VERY IMPORTANT.

DO NOT WRITE ON A DISKETTE WITH A BALL POINT PEN. YOU CAN DAMAGE THE DISKETTE'S SURFACE. Preferably, you should write on the label before it is adhered to the DISKETTE. If you must write on a label already adhered to the DISKETTE, BE SURE TO USE A FELT-TIPPED PEN AND PRESS VERY LIGHTLY.

vi) KEEP A BACK-UP COPY OF ANY PROGRAMMES YOU HAVE ON A DISKETTE. IF THE MATERIAL IS ORIGINAL AND IMPORTANT, KEEP TWO OR EVEN THREE BACK COPIES.

5. Push the POWER SWITCH 5 on the COMPUTER E to the "ON" position. A POWER LIGHT 6 on the KEYBOARD F will light up. If it does not, ASK THE LAB TECHNICIAN FOR HELP.)

6. "APPLE II" will appear on the screen of the MONITOR B and the DISK DRIVE LIGHT 7 comes on. PRECAUTION: AS A GENERAL RULE DO NOT TRY TO REMOVE THE DISKETTE WHEN THE RED LIGHT OF THE DISK DRIVE IS ON. (THE DISKETTE IS ENGAGED.) You will hear a whirring sound from the DISK DRIVE. If nothing appears on the screen for about 30 seconds and the disk drive light stays on...

   a) Push the POWER SWITCH 5 on the COMPUTER E to the "OFF" position.

      NOTE: Be careful when you open the DISK DRIVE DOOR. It has a spring. Avoid having the door spring open by keeping pressure on the door so that it opens slowly.

   b) Lift the DISK DRIVE DOOR 4 of the DISK DRIVE C up and check to see that the DISKETTE is placed correctly in the DISK DRIVE SLOT.

   c) Close the DISK DRIVE DOOR 4.

   d) Turn the POWER SWITCH 5 on the COMPUTER E to the "ON" position.

   e) At this point, the information on the screen should put you into direct contact with the program which will provide you with the necessary directions.

TO TURN THE COMPUTER OFF

1. Lift the DISK DRIVE DOOR 4 and remove the DISKETTE D.
2. Push the POWER SWITCH 5 on the COMPUTER E to "OFF".
3. Turn the POWER SWITCH 2 on the MONITOR B to "OFF".
4. Leave the POWER SWITCH 1 on the POWER BAR A in the "ON" position.

LAB
EXERCISE
ONE

UTILIZING THE APPLE II MICROCOMPUTER
USING PREPARED PROGRAMMES

OBJECTIVE: Students will operate the Apple II microcomputer using three (3) prepared instructional programmes.

REQUIREMENTS: An Apple II Microcomputer Station
Two Diskettes: 1. "Pilot"
Programme Selection (1) "Legends"
(A tutorial exercise)

2. "Elementary My Dear Apple"
Programme Selection (2) "Lemonade"
(A simulation exercise)
Programme Selection (3) "Don't Fall"
(A drill exercise)

INTRODUCTION: In this exercise you will be using three prepared programmes. They are designed to be used by persons with no programming experience. The diskettes you will be using will automatically be displayed on the T.V. monitor when the power is turned on. In both cases the computer is under the control of the programme which will give you instructions, ask questions and then act on your responses.

TO BEGIN

1. Go through steps 1 to 6 as described on pp 8-11. To Activate the Computer. At step 4, after removing it from its protective cover, insert the diskette labelled "Pilot-Legends."

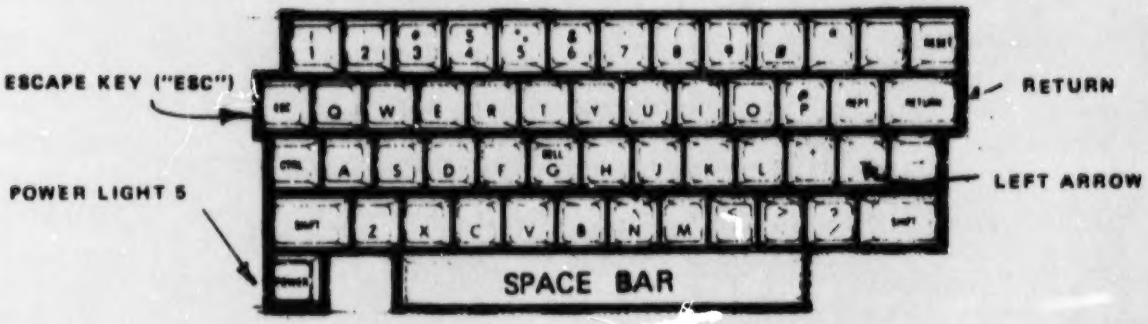
2. If you have been succesful the screen will display a message asking you to "Press the Return Key" or "Switch to the Second Diskette." As you have not completed the first exercise at this point, you will press the Return Key to commence the exercise. Follow the directions of the programme as displayed on the monitor. Do not worry about making mistakes; the tutorial is written for children who will not get the right answer first time around.

NOTE: ON THE USE OF THE KEYBOARD

a) For purposes of this exercise there is no distinction between upper and lower case.

b) To correct a typing error, use the left arrow to back up. The back-up automatically erases the digit; type in the correct digit.

c) With the programmes you may be asked to press certain specialized keys. Note the location of these keys on the diagram. For Example: In Legends, after you enter a response to a question you must press the RETURN key to indicate to the computer that you are ready to continue.



3. When the programme ends, it will return to the optional instructions identified in 2. If you have time to spare, you may wish to rerun Legends; otherwise, PREPARE to go on to the second diskette

a) Turn the COMPUTER E, POWER SWITCH 5 to "off".

b) Lift the DISK DRIVE DOOR 4 and remove the diskette.

c) Please place the diskette back in its protective envelope cover.

4. Place the second diskette - "Elementary, My Dear Apple" in the DISK DRIVE SLOT ; close the DISK DRIVE DOOR 4 and turn the COMPUTER E POWER SWITCH 5 to "on".

5. The "APPLE II" Logo will appear on the display followed by a menu with five (5) choices.

6. Type "2" to run the simulation exercise "Lemonade".

7. "Lemonade": Two persons can compete during this simulation exercise, each trying to clearly discover and control the critical variables so as to produce the maximum profit.

   BE SURE TO SET A TIME LIMIT ON THIS EXERCISE. IT COULD GO ON FOR A CONSIDERABLE TIME.

8. When you have had enough "Lemonade" press the ESCAPE key which will return the display to the original menu.

9. Press "4" on the keyboard to engage the third programme "Don't Fall".

10. "Don't Fall": This programme uses a version of the Hangman game to stimulate interest for a drill exercise.

    BE SURE TO SET A TIME LIMIT ON THIS EXERCISE ALSO.

11. When you have had enough of "Don't Fall" you have one of two options.

OPTION A TO TERMINATE THE LAB EXERCISE HAVING COMPLETED THE REQUIRED WORK	OPTION B TO GO ON TO THE OPTIONAL EXERCISE
a) Turn the COMPUTER E POWER SWITCH 5 to "OFF".	a) Press "ESCAPE" to return to the main menu.
b) Lift the DISK DRIVE DOOR 4 and remove the DISKETTE.	b) Select choice "5" to end the "Don't Fall" exercise.
c) Place the DISKETTE in its protective envelope cover.	c) Type in "FP" and press "RETURN". This will produce a prompt symbol "]" to the left of the screen. YOU ARE NOW IN CONTROL OF THE COMPUTER.
d) Turn the POWER SWITCH 2 on the MONITOR B to "OFF".	
e) Leave the POWER SWITCH 1 on the POWER BAR A in the "ON" position.	d) Go to p. 15 and follow the instructions to complete the exercise "Programming the Apple II Computer".
12. Complete the quiz and the New Lab Evaluation.	
13. Hand the quiz sheet (DO NOT TRY TO SCORE THE QUIZ ON THE SCORING MACHINE)evaluation sheet and the Lab 5 control card to either the Computer Lab Operator (A313) or the Media Lab Instructor (B123).	

LAB EXERCISE II

PROGRAMMING THE APPLE II COMPUTER

OBJECTIVE

Up to this point, you have been interacting with programs already prepared for the computer. It has been telling you what to do.

In this optional section of this unit, you have the opportunity to tell the computer what to do by writing a brief program. The program language you will be using is called BASIC.

DIRECTIONS

As you noted in the "print-out" examples on pages 4 and 5 a program consists of a series of commands you enter into the computer. By proceeding with the following steps, you will enter a series of commands which will program the computer to generate the square roots of all even integers from 10 to 50. As you go through each step, an explanation will be given to help you understand what your command means. Type into the computer only the information you see in bold capital letters or numbers. There are only capital letters available, so you do not use the shift key for letters. You will have to use the shift key for certain symbols.

A) If, as you start, the cursor(the flashing white square) is not in the upper left margin of the screen, type:

HOME (then press the Return Key)

B) Next you want to be sure there are no programs already in the computer to foul up the one you will do. To clear its memory, type:

NEW (press Return)

C) Now you are ready to program. Each program command you give a computer requires an address code. These codes are numbers 1 to however many commands are necessary to complete the program. They precede the command statement. In your next entry, you will type the address 1 followed by your first command. Type:

1 N = 10 (press Return)

Make sure you distinguish the letter "O" from the number "o".

Note: By now you should have the idea that everytime you type a statement into the computer, it must be entered from the left margin. Pressing the Return Key moves the cursor to the left margin and prepares the computer to receive a new statment.

- -

If you make a mistake in your typing (and the computer will sometimes tell you this by giving for the message " SYNTAX ERROR"), make your corrections in the following manner. Return the cursor to the left margin by pressing the Return Key, and retype the address and complete command. You can do this as many times as necessary. The computer will only register your last entry for any address. (There is a procedure for editing a command, but you will not be learning this function now.)

If you make a lot of errors (or a few) and want to clean up the mess on the screen, you can type:

LIST (press Return)

What appears on the screen are your last entries for each address.

- -

Let's return to the program. When you typed in N= 10, you are telling the computer that the value of the first number to consider is 10.

D) Now enter the second command. Have you pressed the Return Key? Type:

2 PRINT N, SQR(N) (press Return)

Your second command in your program tells the computer to display on the screen the value of N and its square root. It will not do this, however, until you give the command at the end of the program.

E) So far, so good. Now enter the third command. Type:

3 N = N + 2 (press Return)

You are now telling the computer to consider the next value of N which is 2 more than the previous value. Remember, you are after the even integers only. If you wanted all the integers, you would type N + 1.

F) Now type carefully:

```
4   IF  N <= 50  THEN GOTO 2.
```

The language you used in this command saves a great deal of programming time on your part. You do not need to enter all the even numbers between 10 and 50. You are telling the computer in this command to go back to command 2 until the value of N is equal to 50. As long as it is less than 50, it will go back to step 2 with 2 the next larger even number resulting from your third command, and continue on.

G) Check your complete program. It should read as follows:

```
1   N= 10
2   PRINT N, SQR(N)
3   N = N + 2
4   IF  N<= 50  THEN GOTO 2
```

If you need to correct any mistakes, see the procedure above. Does your program match the above? If so, you are now ready to execute your program. You do so by typing:

```
RUN     (press Return)
```

If all has gone well, you should see displayed a table of integers and their square roots.

Congratulations! If you have time, you might find it interesting to modify this program. You can recall it by typing:

```
LIST
```

You now change individual commands simply by retyping them. For example, change the third one to read

```
3  N=N+5.
```

- -

If congratulations are not yet in order, you may see on your screen the message "syntax error" after you typed RUN. If so, type:

LIST (press Return)

Compare your program again to the one shown in Step G, and make your corrections. And try again!

NAME_____ DATE_____

UNIT 5 - MICROCOMPUTERS

1. If the definition of hardware as described in this unit is applied to the medium of motion pictures, which of the following is the hardware:

   a) the 16 m.m. projector
   b) the 16 m.m. projector and the storyboard & script
   c) the reel of 16 m.m. film
   d) the 16 m.m. projector and the reel of film

2. Which statement relates to the software aspect of computers:

   a) students in Mr. Campbell's class practiced their multiplication tables on their PET computer using a drill exercise - Let's Multiply - marketed by HARROWSMITH MICROCOMPUTER PROGRAMS INC.

   b) Miss Withit wrote a program for her social studies class which had branching programs for "fast" and "slow" sub groups.

   c) When selecting a microcomputer system for his school, Mr. Modern selected a disk drive system over a cassette system.

3. The Don't Fall exercise is an example of ---------- programming.

   a) tutorial
   b) drill and practice
   c) simulation/gaming
   d) dialogue

4. The Lemonade exercise is an example of ---------- programming.

   a) tutorial
   b) drill and practice
   c) simulation/gaming
   d) dialogue

5. Which precaution(s) must be taken to protect information contained on a diskette.

a) avoid magnetic fields
b) avoid ultra violet light
c) do not handle exposed surfaces
d) hire a security guard

6. Which of the following descriptors represents the most powerful memory capacity of a computor.

a) 4 K
b) 8,000 Bytes
c) 64 K
d) ATLAS

EVALUATION

MICROCOMPUTERS

This is a new Lab Unit. Your evaluation will help your instructors to eliminate faulty and/or weak sections in future editions. Thank you in advance for your assistance.

George and Fred

---

1. The objectives of this Educational Media Unit were clearly stated.

Agree				Disagree
1	2	3	4	5

2. Basic terminology (Introduction to Microcomputers) was clearly explained.

Agree				Disagree
1	2	3	4	5

3. I experienced no difficulty in following the description of the process To Activate the Microcomputer.

Agree				Disagree
1	2	3	4	5

4. For Lab Exercise I

a) The directions which permitted me to establish contact with the computer programmes were clear.

Agree				Disagree
1	2	3	4	5

b) I enjoyed the Legend programme.

Agree				Disagree
1	2	3	4	5

c) I enjoyed the Lemonade programme.

Agree				Disagree
1	2	3	4	5

d) I enjoyed the Don't Fail programme.

Agree				Disagree
1	2	3	4	5

e) The time allowed for Exercise I was sufficient.

Agree				Disagree
1	2	2	4	5

f) Indicate the number of occasions you requested help from the Lab Instructor, by circling the appropriate number.

0 1 2 3 4 5 6 7 8 9 10

Where was help requested? (Page and Line)

_____

_____

_____

5. Indicate if you tried the optional Lab II Exercise.

____yes ____no

6. If you answered yes to No. 5, please complete the following questions on Exercise II: Programming the Apple II Microcomputer.

a) I had no problems following the instructions.

Agree				Disagree
1	2	3	4	5

b) I succeeded in getting the programme to work.

____yes ____no

c) The time allowed for Exercise II was sufficient.

Agree				Disagree
1	2	3	4	5

7. This new lab is a valuable addition to the Educational Media course.

Agree				Disagree
1	2	3	4	5

Comments/Suggestions. Please use this open space to indicate any portion of this unit (page no. and line(s)) which was unclear/should be revised, etc.

_____

_____

_____

_____

8. Time taken to complete the Program _____ Minutes.

Thank you for your help.